

**Two New Species of *Paradelius*
(Hymenoptera: Braconidae) from North America
with Biological Notes**

JAMES B. WHITFIELD

Department of Biology, University of Missouri, St. Louis, MO 63121

INTRODUCTION

It has been known for some time that an undescribed species of braconid resembling *Paradelius ghesquierei* de Saeger (from the Belgian Congo, now Zaire), exists in western North America. This is reflected in the inclusion of *Paradelius* in the key to Nearctic genera of Braconidae by Marsh et al. (1987), despite there being no described North American species. I have recently had the opportunity to rear this species in good numbers from one of its hosts and have received reared specimens from two additional hosts. In addition, a second, morphologically quite distinct species has been collected in Texas. Below I describe both species and discuss their apparent relationships with the previously known African species.

Genus *Paradelius* de Saeger

***Paradelius* de Saeger, 1942: 313. Type-species: *Paradelius ghesquierei* de Saeger, original designation.**

De Saeger (1942) based this genus on a single species from the Belgian Congo, questionably reared from *Enarmonia* sp. (Lepidoptera: Eucosmidae). As all reliably reared species of Adeliinae have been associated with leafmining Lepidoptera, especially Nepticulidae, the host record is somewhat suspect.

Nixon (1965) remarked that in the British Museum (Natural History) there are several undescribed South African species apparently belonging to *Paradelius*, one of which differs in having a strongly sclerotized “carapace” incorporating metasomal tergites I-III, all rugose, and in having the metacarp absent. The second species described below matches this African species in the first feature. I have chosen not to recognize a new genus for these two species, as the metasomal structure seems to me to be only an extreme form of the sculpturing trends found in other *Paradelius*.

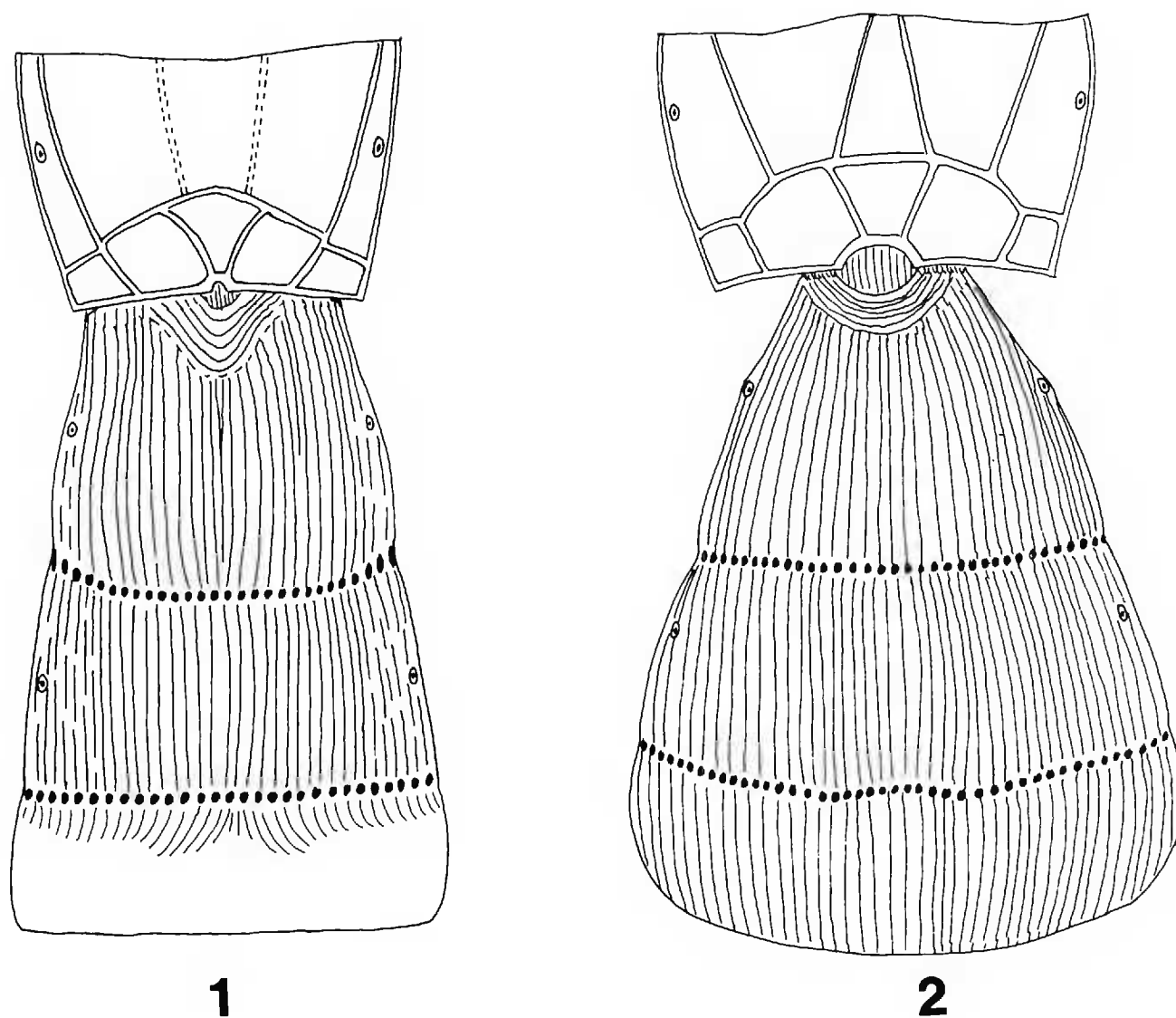
All of the species of *Paradelius* can be easily distinguished from *Adelius* Haliday (see Mason, 1985 for nomenclatural discussion of *Adelius* versus *Acaelius*) in having the first two metasomal tergites coarsely sculptured, usually with a combination of rugosity and an overlay of longitudinal ridging (especially on the second tergite). In *Adelius*, there is no macrosculpturing on the anterior tergites at all and the line separating the first two is often difficult to distinguish.

***Paradelius rubra* sp. n.**

(Figs. 1, 3, 5, 6)

Female. Body length 1.8–2.3 mm. Fore wing length 1.6–1.9 mm.

Head entirely orange-brown, surface strongly granular. Frons 1.2–1.4x as broad as long, weakly bulging medially. Clypeus small, strongly convex. Scape as long as

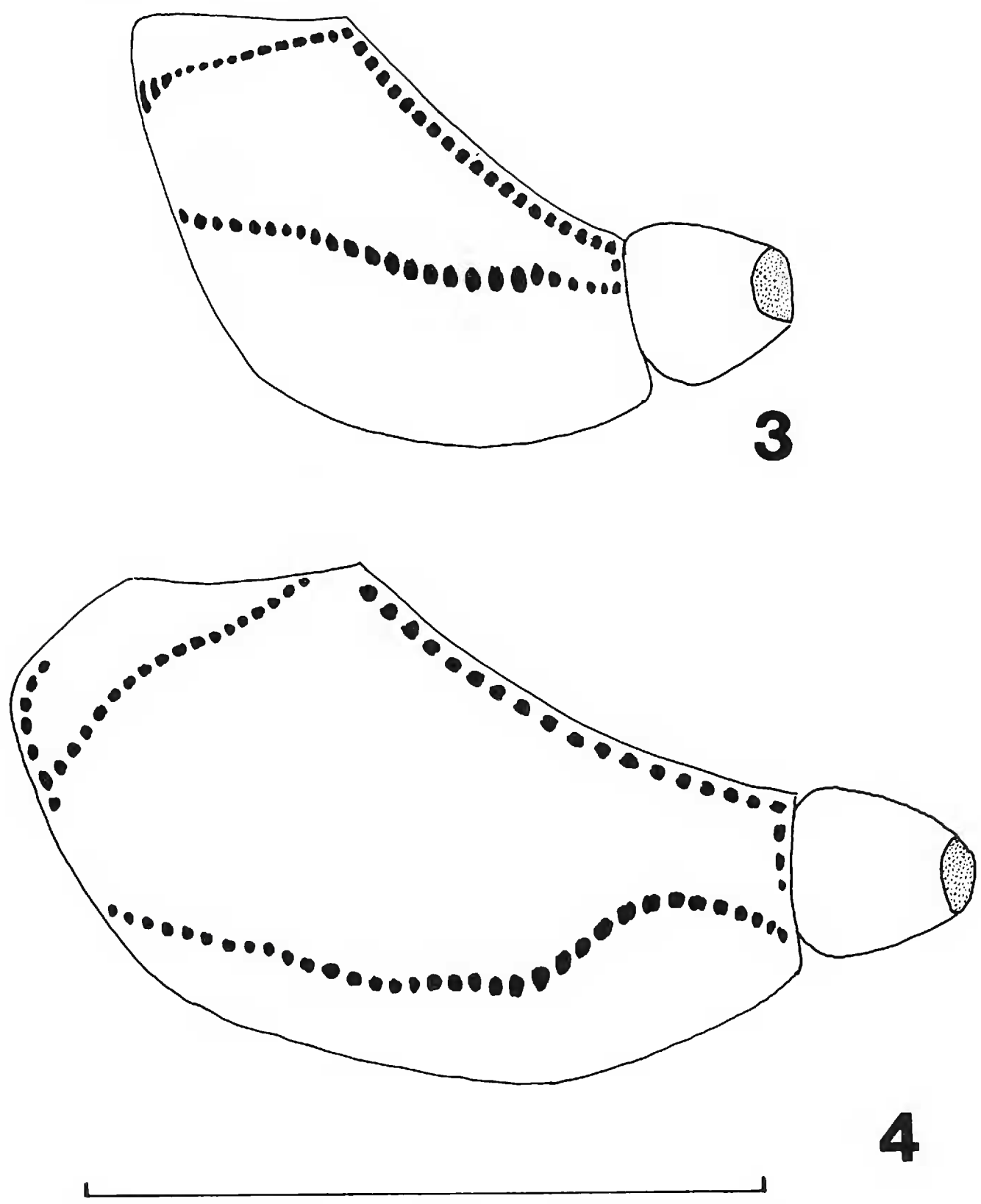


Figures 1, 2. Propodea and anterior metasomal tergites of: 1, *Paradelius rubra*, sp. n., ♀, California, ex *Stigmella variella*; 2, *P. nigra*, sp. n., ♂, Texas. Scale-line = 0.5 mm.

or longer than pedicel and first flagellomere combined. Flagellum 18-segmented, orange basally, becoming dark brown over distal 0.7–0.8. Distal flagellomeres each swollen anteriorly with denser patch of small hairs. Postgenae and occiput well-developed; head broadest just behind eyes. Occipital carina well-developed and complete. Palpi paler yellow-brown.

Mesosoma mostly orange-brown, becoming dark brown to black dorsally posterior to mid-mesoscutum and ventrally anterior to middle coxae. Pronotum with only weak ventral groove and shallow granular/longitudinally aciculate sculpturing. Mesoscutum broad, strongly granular, matte, without notauli. Scutoscutellar scrobe deeply but finely crenulate. Mesopleuron weakly granular to dorsally more aciculate, with distinct, weakly sinuate, crenulate longitudinal groove (fig. 3). Disc of scutellum strongly triangular. Propodeum rugose, with superimposed carinae as in fig. 1. Metapleura usually orange-brown and strongly contrasting with dark brown propodeum.

Legs. Prothoracic and mesothoracic legs orange-brown, with slightly darker tibiae. Inner midtibial spur large, 1.5x as long as outer. Hind legs darker brown. Hind tibiae enlarged, swollen subapically to approximate thickness of hind femora

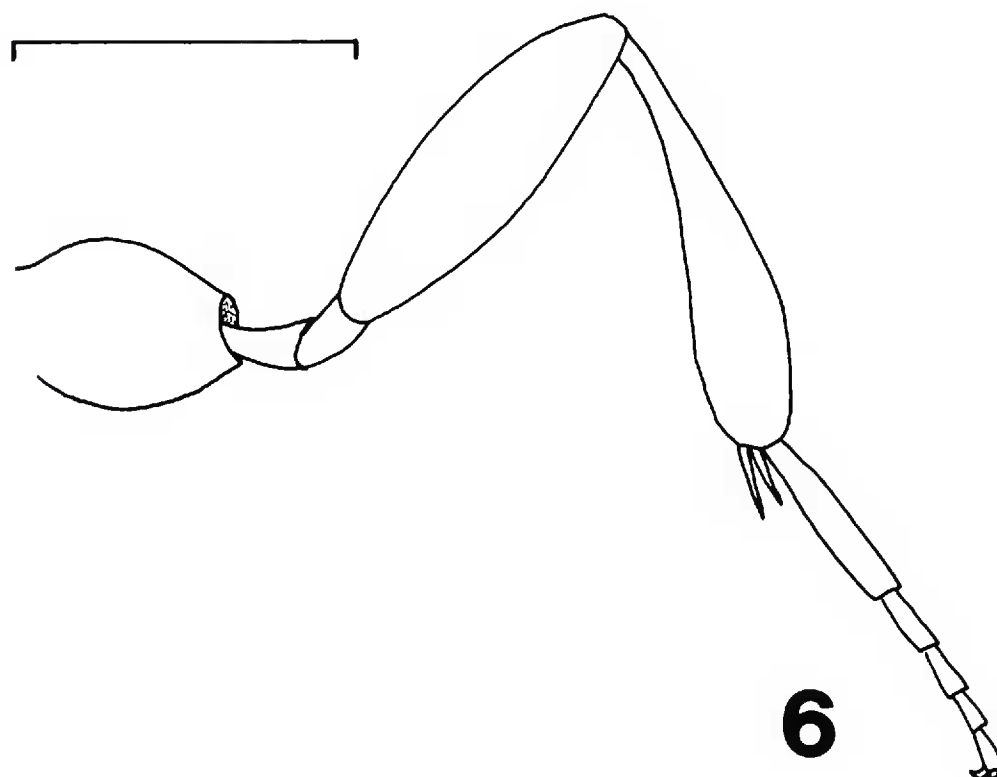
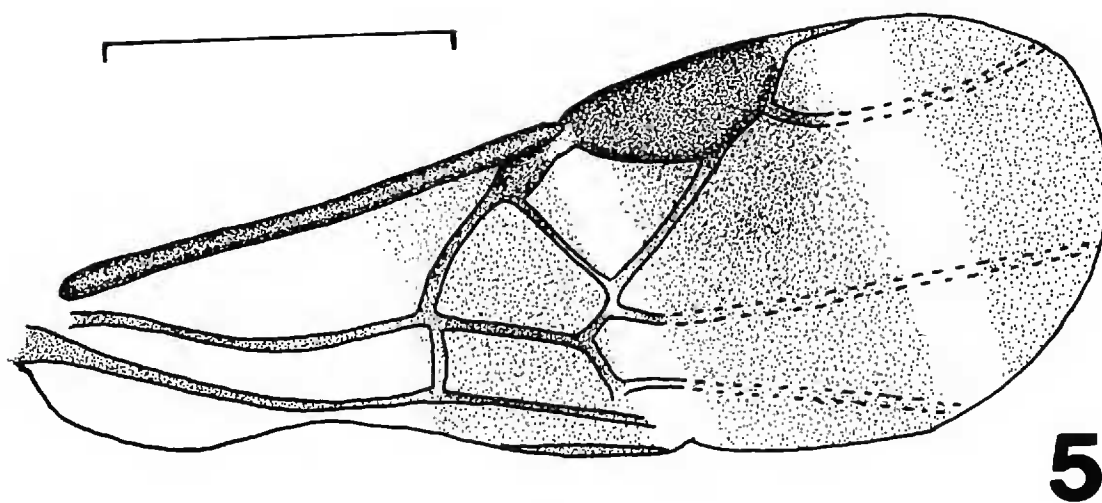


Figures 3, 4. Mesopleura of: 3, *P. rubra*, same specimen as above; 4, *P. nigra* (same specimen as above). Scale-line = 0.5 mm.

(fig. 6), rounded apically, with inner spur slightly longer than outer. Outer surface of hind tibiae armed with numerous minute, short, black spines.

Wings. Venation as in fig. 5 with three infuscate bands. Tegulae orange-brown.

Metasoma. Dorsum entirely dark brown to black, venter paler. Tergites I & II (fig. 1) broad, covering entire dorsal width of metasoma, with spiracles near lateral edges. Tergite I almost as long as apically broad; tergite II nearly twice as broad as medially long. Both tergites, as well as the anterior 0.2–0.4 of the third, longitudinally striate and separated from one another by thin crenulate grooves. Tergite III sculptured



Figures 5, 6. 5: Fore wing of *P. rubra*, ♀. Scale-line = 0.5 mm. 6: Hind leg of *P. rubra*, ♀, lateral view. Scale line = 0.5 mm.

only over anterior 0.2–0.4. Tergites IV–VI also partially visible in dorsal view, unsculptured. Hypopygium not reaching apex of metasoma. Ovipositor and sheaths short, subexserted; sheaths hairy on apical expanded portions. In most dried specimens the metasoma is strongly dorso-ventrally flattened.

Male. Body length 1.6–2.1 mm. Fore wing length 1.4–1.5 mm. Coloration and sculpturing usually very similar to female. Metasoma slightly narrower in dorsal view than in female.

Cocoons. Pupates within cocoon of host nepticulid, after emerging from host larva/prepupa.

Type material. HOLOTYPE ♀: CALIFORNIA: Alameda Co., Del Valle Lake Rec. Area, 11-II-1984, JBW no. 84B21, ex *Stigmella* on *Quercus agrifolia*, emerged 8-III-1984 (Whitfield) (USNM).

PARATYPES: 11 ♀, 11 ♂, same data as holotype except emergence dates vary from 2-18-III-1984 (USNM, CNC, TAMU, HKT); CALIFORNIA: Alameda Co., Berkeley, 2 ♀ 1-II-1984, JBW no. 84B1, ex *Stigmella* on *Quercus agrifolia* (Whitfield & Wagner) (USNM); 1 ♀, 12-III-1983, JAP no. 83C6, ex *Nepticula* on *Quercus agrifolia*, emerged 8-IV-83 (Wagner) (CNC); 1 ♀, 11-III-1958, J. Powell no. 58C5, ex leaf miner on *Quercus* (Powell) (CNC); Berkeley Hills, Strawberry Cyn., 1 ♀, 25-II-1961, J. Powell no. 61B15, ex *Nepticula variella*, emerged 20-III-61 (Powell) (CNC); Tilden Park, 1 ♂, 22-II-1980, no. L34II80, from *Quercus agrifolia*, emerged 1-IV-80 (Wagner) (USNM); El Dorado Co., 3mi. SW Somerset, 1 ♀, 14-XI-1977 (Wharton) (RAW). OREGON: Pinehurst, 1 ♂, 29-VI-1978 (Townes) (HKT).

Additional material examined. CALIFORNIA: Contra Costa Co., Marsh Cr. Rd. nr. Mt. Diablo, 1 ♂, 12-I-1983, J. Powell No. 83A11, ex *Stigmella* on *Rhamnus crocea*, emerged 30-I-83 (Wagner); Marin Co., S. P. Taylor St. Pk., 1 ♂, 19-III-1983, JAP no. 83C28, ex *Stigmella* on *Lithocarpus*, emerged 19-IV-83 (Wagner), Mendocino Co., Van Damme St. Pk., 1 ♂, 26-IV-1984, JAP no. 84D73, ex *Stigmella* on *Lithocarpus*, emerged 18-V-84 (Wagner). These last three specimens all in author's collection.

Hosts. *Stigmella variella* (Braun) on *Quercus agrifolia* Neé, *Stigmella* spp. on *Lithocarpus densiflora* (H. & A.) and *Rhamnus crocea* Nuttall. These hosts are not apparently closely related within *Stigmella* (Newton & Wilkinson, 1982), but the host plants do overlap in habitat distribution.

Biology. The series from *Stigmella variella* emerged from a very large collection of mined *Quercus* leaves, virtually all picked from sucker shoots at the bases of mature trees or stumps. The adults emerge from the *Stigmella* cocoons in all cases I have yet seen. The adult *Paradelius* run about rapidly on the oak foliage, resembling ants while in motion, a resemblance which is heightened somehow by the infusate bands on the wings, which are held flat over the metasoma. When I aspirated six or seven of the wasps into a glass vial at one time, the wasps seemed to emit a choking, formic acid-like chemical into the air. I was unable to subsequently obtain enough wasps to have the chemical and its origin analyzed. It would be interesting if the substance were actually formic acid, as this would strongly enhance the ant mimicry.

Comments. This species differs from *P. ghesquierei* in, among other features, the more parallel-sided second metasomal tergite and the continuation of the longitudinal sculpturing onto the third tergite.

***Paradelius nigra* sp. n.**

(Figs. 2, 4)

Male. Body length 2.1 mm, fore wing length 1.8 mm.

Head. Entirely black (entire body black except all trochanters, all of prothoracic legs, and middle tarsi, which are lighter brown). Frons finely granular, weakly convex. Clypeus small, strongly convex, about 1.5x as broad as long. Scape slightly shorter than length of pedicel and first flagellar segment combined. Flagellum 18-segmented, entirely dark brown to black. Postgenae and occiput well-developed, head broadest in dorsal view at middle of eyes and just behind eyes. Occipital carina

strongly developed, complete. Palpi medium brownish but not fully visible in specimen (head attached separately to point).

Mesosoma. Pronotum with strong, crenulate, sinuate ventral groove, otherwise granular. Mesoscutum densely punctate, without notauli. Scutoscutellar scrobe narrow, crenulate. Mesopleuron punctate ventrally and anteriorly, smooth and polished posterodorsally, with narrow, crenulate, strongly sinuate longitudinal groove (fig. 4). Disc of scutellum triangular. Propodeum rugose with superimposed carinae as in figure 2.

Legs. Inner midtibial spur long, 1.5x as long as outer. Hind femora and tibiae swollen subapically but not so extremely as in *P. rubra*. Outer faces of hind tibiae with numerous minute black, short spines (difficult to see against dark legs). Inner hind tibial spurs 1.3x as long as outer.

Wings. Very similar to *P. rubra* (fig. 5), but with infusate banding less pronounced. Infuscation strongest in large cloud under stigma. Tegulae dark brown.

Metasoma. Tergites I-III entirely longitudinally aciculatorugose, with spiracles near lateral margins. Tergite I 0.8x as long as apically broad, broadening posteriorly. Tergite II 2.4x as broad as medially long. Tergite III 3.0x as broad as medially long. The three anterior tergites fused into a pseudo-carapace, separated by two crenulate grooves that arch posteriorly medially (fig. 2). Tergites IV-VI visible in dorsal view as narrow strips. Entire metasoma strongly dorsoventrally flattened.

Female. Unknown.

Cocoon. Unknown.

Type material. HOLOTYPE ♂: TEXAS: Gonzales Co., Palmetto State Park, 17-IV-1970 (Board)(USNM).

Hosts. Unknown.

Comments. The shape of the strongly sculptured tergites I-III and the striking colorational differences will easily distinguish this species from the preceding one. It appears to be closest to an undescribed South African species in the British Museum, but has at least a short metacarp, rather than none at all.

ACKNOWLEDGMENTS

I would like to thank Jerry A. Powell (University of California, Berkeley), and David L. Wagner (University of Vermont), for helping locate the excellent site for *Stigmella variella*. Loans of specimens from the following individuals and institutions are also appreciated: W. R. M. Mason, Canadian National Collection (CNC); Henry K. Townes, American Entomological Institute (HKT); David L. Wagner; and Robert A. Wharton, Texas A&M University (TAMU, RAW). Norman F. Johnson and Sydney A. Cameron read and offered useful comments on an earlier draft of this paper. Examination of specimens at the British Museum (Natural History) was done during tenure of a fellowship awarded by the North Atlantic Treaty Organization in 1985; the assistance of Mr. Tom Huddleston at the Museum is greatly appreciated.

LITERATURE CITED

- Marsh, P. M., S. R. Shaw and R. A. Wharton. 1987. An identification manual for the North American genera of the family Braconidae (Hymenoptera). *Mem. Entomol. Soc. Wash.* 13. 98 pp.
- Mason, W. R. M. 1985. The correct spelling for *Adelius* Haliday (Hymenoptera: Braconidae). *Proc. Entomol. Soc. Wash.* 87(4): 896.

- Newton, P.J. & C. Wilkinson. 1982. A taxonomic revision of the North American species of *Stigmella* (Lepidoptera: Nepticulidae). *Syst. Entomol.* 7: 367–463.
- Nixon, G. E. J. 1965. A reclassification of the tribe Microgasterini (Hymenoptera: Braconidae). *Bull. Brit. Mus. (Nat. Hist.) Entomol. Suppl.* 2. 284 pp.
- de Saeger, H. 1942. *Paradelius*, genre nouveau de Microgasterinae (Hymen. Braconidae). *Rev. zool. bot. Afric.* 36: 313–316.